COMPUTERWORLD

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First Patent Is Issued for Software, Full Implications Are Not Yet Known

WASHINGTON, D.C. – The first patent for a software computer program has been issued by the Patent Office to Martin Goetz, Applied Data Research vice president. This represents the first landmark after the withdrawal earlier this year of the proposed "Section 106" designed to outlaw patenting of computer programs.

Details of first patent appear on page 2.

The objections to the patenting of programs have been on two basic levels. Theoretically the main objective was that "programs were just mathematics and you cannot patent math." On a more practical level, it has been observed that there was no way of searching for prior art, as the computer community has not yet developed any effective way of classifying programs. This practical problem of searching has a secondary, but definitely real, impact due to the fact that the Patent Office is currently short of funds and presumably would not welcome a flock of computer patent applications.

Inventing in a Garret

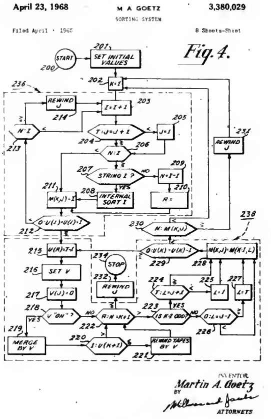
It appears possible that such a rush may develop as a result of the precedent set by the software patent. Before this, patents involved logic design of actual hardware which few programmers were able to do and which even fewer could arrange to have built if the Patent Office wanted to see the system in operation.

Under the new procedure, it appears that a programmer working by himself, or in the traditional garret, may be able to get a patent and so exclude the hardware manufacturers from using his technique without his agreement. He still has to show novelty, and the traditional flash of genius, but the almost mandatory cooperation of one of the industry giants is no longer necessary.

Infringement Possibilities

In the meantime the current position is that any installation which is currently using the sorting technique proposed by Martin Goetz is legally infringing his rights – no matter where they got the program, whether from a manufacturer or from one of their own programmers.

The infringement appears to start when the program is loaded (because that effectively is a manufacturing process) and continues when the program is used. Whether the program is obtained by sale, is obtained free, or is paid for does not affect the matter.



Flow chart from first software patent.

7090 or User-Designed Codes Work on System

LOS ANGELES, Calif. – A new computer system was introduced here which, far from forbidding the user to change its microprogramming, encourages him to do so. The IC-6000E introduced by Standard Computer Corp. is particularly for universities and other educational institutions and comes with a number of different machine codes. These machine codes, which currently include those of the IBM 7090, 7044, and 1130 systems and a specialized Fortran system, are supported through a microprogramming system called Miniflow. The same Miniflow system allows other machine codes to be designed by the user to fit his own particular problems.

Changes in Under a Minute

The design for the system – called a fourth generation by the manufacturer – is such that researchers in management sciences, linguistics, electrical engineering, etc., can create new computer systems at will and study their applicability to the particular type of problem they are considering. Changing the machine code from one version to another takes less than a minute and can be done without any engineering support. It is expected that particular researchers will create machine code operations that currently require macros and that as a result, they will get a higher efficiency for their own particular types of operation.

Operating details of the IC-6000E appear on page 7.

Flexible Interfacing

The IC-6000E has a 500 nanosecond access word at a time in its control memory and a memory cycle of 2 milliseconds per word. Input/output operations and interrupt systems are all flexible under the control of the Miniflow, thus allowing interfacing of the computer to different peripherals to be organized on a program rather than on a hardwired basis.

Prices

Prices for the system start at $275,200 and rental at $7520 per month.

Cobol Is Still The Favorite

The results of a *Computerworld* research survey indicate that Cobol is still by far the favorite language with computer users who have the opportunity to select from Cobol, Fortran, and PL/1. Details are given on page 4.

EDP Stocks Up 7% After Setback

Despite sharp losses suffered by the stock market on Wednesday, the day Sen. Robert F. Kennedy was shot, CW's Computer Stock Index gained 6.88% to 153. The Dow Jones industrial average rose 1.78% to stand at 915 on Friday's close. Some analysts think it will soon be breaking through its 1967 recovery high of 943.

Honeywell posted the largest gain among stocks of computer manufacturers, rising 11%, and set a new 1968 high of 139-3/4. Control Data gained 9% to 170-1/2 after setting a high of 174. Both Burroughs and Systems Engineering Labs rose 8%, while Hewlett-Packard gained 7%. Collins Radio, which is laying off 500 employees,

(Continued on Page 13)

IBM Pushes T/S Service

WHITE PLAINS, N.Y. – IBM is offering a new time sharing service that is both cheaper and more flexible than its existing Quiktran service – an indication that IBM may be going after the time sharing utility market in earnest.

The new system, Call/360 Basic, for a minimum charge of $100 a month, allows subscribers to communicate with a 360/85 computer using a version of Basic.

In a parallel announcement, IBM also inaugurated Call/360 Datatext, an improved version of its subscriber text-editing system.

Call/360 Basic offers subscribers a choice of keyboard terminals, including teletypewriters.

"Fast response time, security controls, a large storage capacity, and a ready-made library of IBM application programs are some of Call/360 Basic's features," said L.E. Donegan, Jr., director of IBM's Information Marketing Department.

The version of the Basic used includes new, powerful commands that make it easier to store and handle data, format printed output, and extend the precision of mathematical computations.

Since April, organizations in New York, San Francisco, and Chicago have been using the system in an operational test, communicating with a computer in San Francisco. Additional computer centers are scheduled to be opened in New York and Chicago this summer, with service extended to 34 major cities by year-end. Subscribers dial a local IBM telephone number to gain access to the computer from their terminals.

Subscribers have the option of

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Software Patent Raises Questions

WASHINGTON, D.C. – Whether computer programs are patentable has been in doubt for some years in the United States. They have been granted patents in Great Britain, but the official view of the Patent Office in Washington was not merely that programs themselves were not patentable, but also that anything which was programmable was not patentable.

During various hearings on the matter in 1966 and 1967, a cleavage between the hardware manufacturers and the software houses became apparent, with the hardware manufacturers urging that patents for computer programs be disallowed. One of the arguments placed forward in support of this action was that otherwise it would prevent a purchaser of a computer from fully utilizing his property.

"Hardware" Patents Suspected

While the arguments were going on, legal circles were talking about a method which apparently allowed software patents to be obtained from the Patent Office despite the official position. The technique, it was said, involved writing up a patent application which showed a hardware "embodiment" of the invention, but writing the claims so that a software version of it would also be covered.

One patent often mentioned, issued to A. Hamburgen and assigned to IBM, was for a system for detection and correction of transposition errors. The problem concerned in the latter is stated in the patent to be where two numbers are transposed during copying out various reference numbers, such as a credit card number.

Correcting Transposition Errors

Apparently it has been possible in the past to find that such a transposition has occurred, at least sometimes, but has not been possible to correct it. The Hamburgen patent shows a method of correcting such errors using a hardware system. However, the function concerned is clearly of interest to anyone involved in cleaning the input into computers, and the method appears to be suitable to most present day computer systems, with terms like "shift," "compare" being used (see picture).

The First Patent

The Goetz patent issued for an oscillating sort allows tape units which can read forward only to be used. When oscillating sorts were first invented by S. Sobel in 1962, it was believed that they were useful only in the case of tape units which could read backward. This made them comparatively uninteresting, as most of the tape units then in use read forward only. Typical of such tape units were the IBM 729, Control Data, and Univac III-C transports.

The Goetz invention has the ability to use this style of tape units for the oscillating sort and so allows this technique to be used with most of the then-standard systems. In addition, it was also pointed out that there are certain cases where the saving in rewind time and in elapsed tape time could also be significant and might make it more economical to use the Goetz method than the Sobel method, even where read-backward facilities were available. This particularly applies where the rewind time is a major problem and where the tape drive concerned spends a considerable amount of time in changing direction.

Currently, the IBM 2400 models I and IV take over 100 milliseconds, while the other models of the 2400 system take under 20 milliseconds to change direction.

Attorney's Triumph

The issue of the patent must also be regarded as a triumph for a Philadelphia attorney, Morton C. Jacobs. Jacobs (who prepared the patent) is well known in the computing field, and has participated in meetings at the Spring Joint Computer Conference as well as in purely legal areas on the matter of patent and copyright law as it affects computers.

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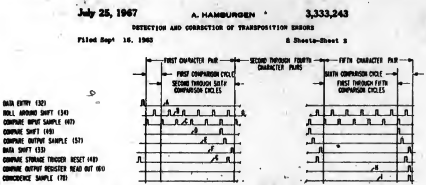

July 25, 1967 A. HAMBURGEN 3,333,243

DETECTION AND CORRECTION OF TRANSPOSITION ERRORS

Filed Sept 16, 1965 2 Sheets-Sheet 2

FIRST CHARACTER PAIR
SECOND THROUGH FOURTH CHARACTER PAIRS
FIFTH CHARACTER PAIR
FIRST COMPARISON CYCLE
SECOND THROUGH SIXTH COMPARISON CYCLES
SIXTH COMPARISON CYCLE
FIRST THROUGH FIFTH COMPARISON CYCLES
DATA ENTRY (32)
ROLL AROUND SHIFT (34)
COMPARE INPUT SAMPLE (47)
COMPARE SHIFT (49)
COMPARE OUTPUT SAMPLE (57)
DATA SHIFT (33)
COMPARE STORAGE TRIGGER RESET (48)
COMPARE OUTPUT REGISTER READ OUT (61)
COINCIDENCE SAMPLE (70)
A
B
C
D
E
F
G
H
J

FIG. 2

Detail from the Hamburgen patent showing written explanation, left, that bears a striking resemblance to software programming instructions.

GSA Urges Small Firms to Submit Bids

WASHINGTON, D.C. – The prospects of an increased share of government money going to the smaller manufacturers of computers and computer peripherals became brighter this week when the General Services Administration (GSA) again urged such manufacturers to offer their equipment through the standard GSA channels. Commissioner H.A. Abersfeller of the Federal Supply Service told *Computerworld* that the GSA had written to all of the 50 firms that were listed at the recent hearings before Sen. William Proxmire by Louis Caveney of Bryant Computer Products. "We have sent invitations to all those who indicated any interest," he said. "Some of them were already on the list and others were not. It was not worthwhile trying to get them on the schedules for the remnant of the current fiscal year, so we arranged to start them at the beginning of the next fiscal year; that is, July I."

A number of the smaller firms, coping with the task of preparing GSA style information for the first time, were not certain they would be able to meet the necessary deadlines. "We only got the invitation a week ago," one vice president told *Computerworld*, "and we hope to be able to do it. We have called in an expert on government procurement to help us from our corporate area, because we have never done this before. Here's hoping we get it through on time."

At the same time the investigation of plug-for-plug compatibility possibilities was also being pressed by the General Accounting Office (GAO). The magnetic tape unit situation, which is the major component of the investigation, the subject of hearings in Boston, and other peripherals were being investigated elsewhere.

The GAO report on the matter is expected to be presented to Sen. Proxmire's Subcommittee on Economy in Government shortly.

Navy Releases Phase 2 of Cobol Test

WASHINGTON, D.C. – The second phase of the U.S. Navy Cobol Tests Routine has been released by the Navy Programming Languages Standards Group. These routines, like those in the first phase, test not merely the language of the compiler, but also the object program execution. The new routines test the segmentation, report writer, and library facilities of compilers.

Originally designed also to test random access processing, this facility has now been dropped as the item is out of the proposed Cobol standard.

In general, the tests are simple to carry out, as the input is being created as part of the procedure division test.

The new phase is available, together with a revision of Part I of the tests, from the Navy Programming Languages Standards Group in the Pentagon. It is completely compatible with the proposed U.S.A. Standards Institute Cobol.

IBM Offers Faster T/S Service

(Continued from Page 1)

using IBM 2741 communications terminals, with a keyboard designed especially for remote computing, or Teletype terminals Models 33 and 35.

A minimum monthly usage charge of $100 covers various combinations of system use time, storage utilization, and establishment of the user's own program library, as well as access to the IBM applications program library. Terminal and local telephone line costs are additional. Monthly rental for an IBM 2741 is $103.50.

Quiktran 2, IBM's subscriber time sharing system now used by organizations and individuals across the country, will continue in operation.

Call/360 Datatext

Call/360 Datatext allows subscribers to use an IBM 2741 linked to a centrally located computer to prepare and revise text and maintain files and records. With the system, construction and engineering specifications, technical manuals, and library catalogs can be prepared and updated with a minimum of clerical effort.

Call/360 Datatext provides significant improvements over the original version introduced by IBM in 1966. At its hub is a 360/40 instead of the previous IBM 1460. The system has a faster response than the earlier version and is available to users for 12 hours daily, five days a week.

A user can subscribe for a minimum monthly charge of [illegible]0 plus terminal and local telephone line charges.

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More Lines, I/O Mark New U-418 III

PHILADELPHIA – A new computer which can theoretically handle 416 full duplex telephone lines simultaneously – and practically handle over 200 – has been introduced by Univac. Called the 418 III it is a successor to the earlier 418 models and will be delivered in a year's time. The pricing is expected to average $18,000 per month as compared to the $11,000 per month for the current 418 systems.

The 418 III is a medium scale system adapted for message switching and real-time operations. It can handle a maximum throughput of 2.66 million 18-bit words/second with two input/output control modules.

Improvements

In order to provide for the high throughput, Univac has made a number of design changes between the 418 Model II and III. It has dropped the memory cycle from 2 microseconds to 750 nanoseconds and has provided independent accesses to the core memory blocks from both the input/output modules and from the central processing unit. This 3-way simultaneity is one of the prime features of the new design, providing for a possible ten-fold increase in total throughput.

Another feature designed to reduce the overhead involved in constantly handling interrupts allows a data transmission by a peripheral to be "tabled" until the processor has the time to look at it, rather than always interrupting the main program immediately.

Gale Gibson of Univac's Product Management Division told *Computerworld* that while the original 418s were by no means dead (72 were due to be delivered in 1968), the new system was designed for the much heavier load of the modern systems. The new techniques are expected to allow peak loads on the input/output channels to be greatly reduced and to improve the turnaround time.

Conversion

Users of current 418s who wish to move upwards will find that the critical software associated with the system is being provided by Univac in more detail than previously. "They can convert their programs to the new system with very few changes," said Gibson. "What they primarily have to do is to delete the I/O detailed instructions and replace them with 'get' and 'put' macros."

A complete 418 III system utilizes a full complement of peripheral equipment, including high speed drums, magnetic tape equipment, Fastrand mass storage units, as well as a variety of remote data terminals.

An extensive real-time operating system is available with the system including an executive system, Cobol, Fortran, communication handlers, real-time control, and file control.

Designed for efficient multiprogramming, the executive system is the basic software package to facilitate real-time operation. The system's sub-elements, including a real-time communications control, minimize job execution time to allow the user to concentrate on application programming.

Application oriented programming languages offered with the system include Cobol for real-time transactions and batch business processing, Fortran IV for simplifying and expediting engineering and scientifically oriented problems, and an Art Assembler, providing a programming language option for using 418 III instructions in symbolic form. Another segment of the operating system is a systems support library containing service routines and utility programs.

The core storage of the central processor has a 750-nanosecond read/restore cycle time. It is modularly constructed to store from 32,768 to 131,072 18-bit words in one to four banks with one or two 16,384 modules per bank. The main storage can be accessed in three ways simultaneously by two input/output modules and the command/arithmetic section.

Univac 418 III computer system

Timing

The typical instruction time is 1.5 microseconds. A double precision add is completed in 2.5 microseconds. Floating point and binary conversions are additional hardware features.

A modular communication control device, known as the Communication Terminal Module Controller (CTMC), regulates input from remote terminals to the 418 III. Through one CTMC, up to 32 communications circuits can be operated in a full-duplex mode. Allowing reception and transmission at the same time.

Prices

A basic Univac 418 III system consisting of the central processor with a 32,768 word main storage, console, magnetic tape drives, 132 million character direct access mass storage, reader, printer, and control for 32 input/output communication lines (including maintenance) is $12,190 per month on a five-year lease and $14,895 per month on a one-year rental. The purchase price for an identical system would be $590,410.

Deliveries are expected to commence in the second quarter of 1969.

Eniac Remembered

Commemorating the 25th anniversary of the inception of work on Eniac, the world's first electronic computer, Gov. Raymond P. Shafer of Pennsylvania, left, presents a plaque to Robert E. McDonald, president of Univac. Work began on Eniac in May 1943 at the University of Pennsylvania's Moore School of Engineering. The co-inventors, J. Presper Eckert and Dr. John W. Mauchly, formed the Eckert-Mauchly Computer Corp., which later merged with Sperry Rand.

NCR Expands Its On-Line Banking Service Network

DAYTON, Ohio – The National Cash Register Co. will double the size of its on-line data center network during the next six months.

The $3 million expansion program will make on-line banking available to an additional million customers of savings banks and savings and loan associations, the company said.

NCR will inaugurate on-line processing at its centers in San Francisco, Baltimore, Dayton, and Montreal. The company will also open a new data center in Atlanta for both on-line and off-line processing. Initial signees for the services represent institutions with a combined total of a million accounts.

NCR currently operates on-line centers in New York, Boston, Chicago, Los Angeles, and Pittsburgh. These are handling more than four million customer accounts. Teller consoles in subscribing institutions are linked to a data center computer by long distance telephone lines.

Popular Press Warns That Data Banks Are Threat to Privacy

NEW YORK – "The Computer Data Bank: Will It Kill Your Freedom?," an article in the June 25 issue of the massive circulation magazine *Look*, indicates that the public, as well as the computer world, is becoming acutely aware of the dangers of such systems.

But while author Jack Star, *Look* senior editor, faithfully describes data banks and the information they could contain, he fails to fully spell out the dangers or to recommend alternatives. He mentions, for example, "that a laser memory process will permit the storage of a 5000-word dossier for each of 200 million Americans on a single, 4800-foot reel" of tape. He does not mention that copies of such a tape would be of inestimable value to commercial enterprises and hostile foreign powers, and that therefore the security of such a tape could probably never be guaranteed.

Star also lists typical pieces of information that a person would not want generally known about himself and his family, but he never spells out how such information could be used against a person. Although the reader can use his imagination, concrete examples would have given the article more impact.

But Star does an excellent job of pointing out the three main needs: security of information against improper prying, care in the type of information inserted in data banks, and, most important, that people, not machines, must make the final decision based on the available data.

Security Problems

Star describes various security techniques which may be used to tell the computer whether a certain terminal operator is entitled to access certain data, but he concludes with this quote from Dr. Emanuel R. Piore, an IBM vice president:

" 'But . . . in the end, preservation of privacy . . . will still depend upon people: operators, service personnel, supervising officers, and all those who decide what information to put into a computer and how to use it.

" 'Machines have no morals, no ethics; men have ethics and morals. A machine is an idiot device, and it does what people tell it to do.' "

Star stresses the problem of keeping improper information out of the data banks. He notes that it is easier for credit bureaus to record filed lawsuits than it is for them to note their disposition. And he notes that an honest dispute between a customer and a store could lead to a "no pay" notation on the customer's data bank file.

This point was spelled out further in a letter from Russell J. Abbott of Boston published in the May issue of the *Communications of the ACM*, a letter which also indicates the continuing concern of the technical world.

"Personnel departments require information from a potential employee about his arrest record (a meaningless and possibly misleading piece of data in light of our 'innocent until proved guilty' rather than 'innocent until arrested' tradition), about his medical and psychiatric history (information normally accorded great sanctity by our legal system), and of his past record of potentially questionable political associations (i.e. McCarthy-like 'have you ever been a member of . . . ' questions).

"But if organizations important in the computer field have so little regard for individual privacy that they include these and similar questions on forms routinely administered to all interviewees, there seems little hope that less experienced information gathering agencies will have much self-restraint in our fast approaching Big Brother world."

Intentions vs. Results

Star also nicely spells out the great gulf between intentions and results.

" 'Nice people are putting these files together, and always for good purposes,' " he quotes data bank opponent Rep. Cornelius E. Gallagher (D-N.J.) as saying.

Star later quotes John W. Joanis, president of Sentry Insurance, who admitted that his company's system once cancelled 8000 policies:

" 'The computer should be a triggering device rather than a decision maker. It shouldn't be allowed to cancel insurance policies, for instance. When the computer comes up with derogatory information, it should be up to a human to make the decisions.' "

Editorials

America Is Not Sick

Last November, while going to the Fall Joint Computer Conference, I flew into Los Angeles with the late Sen. Robert F. Kennedy. It was before he had his hair cut, and his liveliness shone through a sometimes apparently sullen disposition which ineffectively concealed a brain that was furiously thinking.

As we parted at the Los Angeles Airport, I for the sights and excitements at Anaheim, he for one of the many speaking engagements of his career, it was with no knowledge of the tragic future events to occur in Los Angeles. And yet, an airport was the most suitable place for that last parting.

For he was then surrounded by the fruits of the technologies of the 1930s. The airplanes, and the television cameras which I believe contributed to his death.

Since his death, there have been a lot of people saying that the American Society is sick. I do not believe one word of it. As an immigrant to these shores, I believe that the American dream and the American action is as vital now and alive now as it has ever been. I believe that civilization and a will to fight for the right lives now in this country as strongly, or more strongly, as it does anywhere on this globe.

But, I concede that there are problems. When Sen. Kennedy boarded that airplane last November, he was no stranger to me or to my family. We were strangers to him, but television had so affected our minds that to us he was a live person — someone we might see every day — a type of next door neighbor — and the fact of our meeting thousands of miles away from home was not surprising in the era of mobility brought about by the airplane. **Similarly, Sen. Kennedy, like George Lincoln Rockwell, like Martin Luther King, like Malcolm X, and like President Kennedy, was "personally" known to the assassin and brought into their lethal sphere of influence by the speed of the airplane.**

No, it is not the American Society that is sick — but society in general which is beginning to pay the price of the 1930 technological creations.

We in the computer field have a special interest in this area, because we have in our hands a much more dangerous — to society — weapon than had our predecessors of 30 years ago. Computers, misused or uncontrolled, can kill society — American, German, Indian, or any other human society that we now know — as surely as an assassin's bullet. And computers are our concern.

We will not be able to wait for the danger to become apparent to take preventive action. The events of 1968 had their seeds years before.

We are not yet too late. We can now look ahead to the 1980s and can prepare ourselves and society for those challenges. They are major ones — because parts of the American dream may have to be modified, as part of the price for computers. Let us therefore do so.

If, in 20 years time, we are to be able to look back and to say that we have not failed our responsibilities, then we must act now individually and in a way that no technological group, to my knowledge, has ever done.

Yet the self-sacrifice of Sen. Kennedy will go to no avail if we do not. American Society will be called the guilty one, and we shall go scot-free.

Let this not happen.

Let our associations stand up and be counted — or be thrown aside. Let the real dangers be seen — and let us avoid having to demand sacrificial victims. Let our community act today — and tomorrow — and throughout the coming years to safeguard American Society from the dangers which only we can effectively control.

Then we will deserve the blessings of the healthy American society — and the service of good men of all types. — A.T.

Viewpoint

Dansiger Cites Ways to Ward Off Computer Embezzlement Problems

The Wall Street Journal *story on "embezzlement by computer" (CW April 17) has stirred considerable controversy. One of the persons quoted in the story was Sheldon Dansiger, president of EDP Associates Inc., New York. In the following statement, he presents his views on the issue.*

Sheldon Dansiger

The article that appeared in the *Wall Street Journal* on embezzlement by computer has caused much comment in data processing circles, including your own publication. The article in question began, "'I could steal a company blind in three months and leave its books looking balanced' boasts Sheldon Dansiger, a burly, 33-year-old data processing specialist." Well, I am Sheldon Dansiger. I am 33 years old. I admit to being a data processing specialist and, if pressed, I will even admit to being burly. However, I feel that after those admissions, the rest of the situation must be more clearly defined. The *Wall Street Journal* reporter called to interview me because of my article on embezzling published by a technical news monthly. We had six lengthy interviews during which I outlined my views, which were already a matter of record due to the magazine article. I spoke mostly in the future tense, stating that because of the current wave of paper hitting financial institutions, the elements of pressure and confusion existed that could lead to serious cases of defalcation. I did not at any time indicate that the time was the present. (EDP Associates Inc. has come across cases from time to time at clients, but this information is of course treated as privileged.)

Furthermore, the "boast" was taken out of its context, as it had myriad stipulations and reservations; even then it was stated in the middle of a series of six interviews and was probably plucked out for its headline value.

Cases of this nature, however, have begun to crop up. The *Minneapolis Tribune* of October 18, 1966 carried the headline story of a programmer who manipulated his checking account at the National City Bank of Minneapolis. In commenting on this story, Donn Parker, chairman of the Professional Standards and Practices Committee of the Association for Computing Machinery, writing in the *Communications of the ACM* said, "It is certain that more incidents of this type and of a more serious nature will occur with the proliferation of computer usage in increasingly important roles in society."

Therefore, I am taking this opportunity to say, in consolidated form, what I have said in my magazine article and to the *Wall Street Journal* reporter.

1. Embezzlers exist.
2. Circumstances are such that they will probably begin to flourish in a computerized environment.

(Continued on Page 5)

Research Report

Is Cobol Dying?

In view of the current controversy over whether Cobol is dying, *Computerworld* decided to research the question: How is PL/1 being used in comparison with Cobol?

We selected a system (the IBM 360/50) which allowed for either approach, and set a sample size (150) which would be adequate for the degree of accuracy which we wanted — about 5%.

We then contacted each installation last month and asked the following two questions:

Could you estimate the percentage breakdown of programming language used in terms of machine time?

Do you expect this breakdown to change significantly in the near future? If so, how?

The results we received are tabulated in Tables 1, 2, and 3.

Table 1 shows that most installations have one prime, dominant language and are not really, insofar as machine use is concerned, using much of any other language. It also shows that Cobol is the most favored language, not Fortran or PL/1.

TABLE 1

Dominant Language Used in Installation by Machine Time Involved

	Strongly Dominant	*Dominant*
Cobol	32%	18%
Emulation	16%	9%
Fortran	5%	3%
PL/1	1%	4%

Note: Strongly Dominant means that more than 70% of the time involved uses this language.

TABLE 2

Second Language Used in Installations More Than 30% of the Time

No such second major language	75%
Cobol	11%
Emulation	7%
Fortran	4%
PL/1	3%

TABLE 3

Changes Expected in Future

No Change	40%
Emulation Decrease	23%
Cobol Increase	21%
PL/1 increase	15%
Fortran increase	4%

We felt that these results imply strongly that the business/scientific division between installations is still as valid as it ever has been, and that the provision of "general purpose" systems, although valuable, has not reduced the value of systems which specialize either in business or scientific operations.

In combination, Tables 1 and 2 show the still small number of installations where PL/1 had over 30% of the machine time. Less than 10% of the installations surveyed reported using PL/1 to this extent, which made it the least used language by far.

Table 2 is provided primarily because of the unexpectedly low showing of PL/1. It shows those cases where the second language in the installation was being used at least 30% of the time.

In the future use of languages (Table 3), the favorite was still clearly Cobol, which was already the dominant language in half of the cases, and which was forecast to continue its position, with 21% of the respondees seeing an increasing use of it in the future; which was more than there were people who saw PL/1 use increasing in the future (about 15%).

Input Verification Methods Vary Among Inscribers

This is the fourth in a series of articles on the new keyboard to tape units.

The verification of input data is an expensive, but normally necessary, procedure. If you can avoid it, then it is well to do so, but this will require the assistance of your computer program designers and is outside the scope of these articles. The methods used to perform verification are noted here but, consideration is not given to whether it is actually necessary. That is for you to decide.

There are two major verification methods. One is to look at the hard copy to see what has been produced. This method is available on both the Communitype and the IBM MT/ST units. The other is to backspace and get some form of the character indicated on the console. Ease in reading is a factor, but its relative importance is hard to define.

Communitype key-to-tape unit

The designers of these units have all come up with different methods for verification, normally a sure indication that there is real difficulty here. *Computerworld* is of the opinion that the best design is that of Sangamo which shows the actual character originally on the tape, while locking the keyboard until the operator wants to agree or override the operation. The character is illuminated. There are no codes to interpret.

The IBM Model 50 never shows the character which the operator put on the tape. What it does is illuminate two spots which give a cross reference to the character that the second operator has inserted, but this disagrees with the character already on the tape.

Mohawk and Honeywell both show coded versions of the character already there.

For details of the other units, see Table 1.

When the verification process has been completed the data is now finally on the tape. One major advantage of keying onto tape is the fact that the tape is reusable, whereas cards are not. This makes tape basically more economical. Even so, the cost of the tape must not be ignored. The various units differ extensively in the amount of tape they need to hold a tape file. At the low end, the IBM MT/ST records only 20 characters per inch of tape and leaves spaces of 61 characters between tape records. As s contrast, the latest Mohawk units record 800 cpi and leave only 0.6 inches between records. The difference in cost per tape file is considerable.

Tape Costs for Various Inscriber Units

Unit	Cost of Magnetic Tape Used/80-col.	Magnetic tape Cost/file of 10,000 80-character records
Computer tape at 556bpi or more, 0.6" gap	0:05 cents	$ 5
Computer tape at 200bpi, 0.75" gap	0.06 cents	$ 6
Tally Corp. 1/4" reel	0.45 cents	$ 48
Communitype Corp. cartridges	1.20 cents	$120
IBM Model 50	4.00 cents	$400
IBM MT/ST	7.00 cents	$700

TABLE 2. Comparative cost of magnetic tapes and cartridges used by different units.

Table 2 shows both the characteristics of the costs and gives a this case, 10,000 records of 80 characters each.
characters each.

When the tape has been completed, different systems call for it to be used in different ways. Some expect it to be mounted directly on a computer tape drive, others expect it to be sent across telephone wires to remote sites.

One point may be of interest. When choosing a tape density, if you key directly, you may not have the full choice of 200, 556, and 800 bpi. You may not find a system which matches the rated densities of all the tape units which you want it on (tape density is normally fixed at the factory before the unit is shipped to you). Don't despair — at least not immediately. These are not normal tapes you are creating. These are a new form of tape, an "input only tape." Many tape units can *read* at densities lower than those at which they can *write*. Check your drives before abandoning the consideration of a keyboard to tape unit for this very reason.

One unit, the Communitype, has a quite unusual property. It is an *output*, or receiving, unit as well as being an *input* unit. The Communitype can be left on-line overnight, with paper inserted, ready when the central computer wants to forward a report for the particular office where it is in operation. A normal type of operation here is to set it up for receiving the next day's loading schedule or the inventory report before leaving work for the evening — and taking the completed report out of the typewriter in the morning!

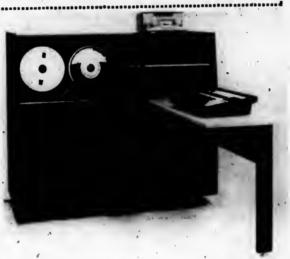
Inscriber Verification Systems

Unit	What an operator sees when checking for a potential keying error.
Honeywell Keytape	One alphanumeric character illuminated
IBM Model 50	Cross-reference to new character shown on console
IBM MT/ST	Hard copy
Mohawk 1101	Hexadecimal indication of single character shown on console.
Sangamo Data Station	Alphabetic character directly illuminated, showing character presently on tape
Tally Data Terminal with typewriter option	Hard copy played out (no re-entry involved)
Communitype	Hard copy played out (no re-entry involved)

TABLE 1. Ways various units permit verification of input

Program Loading

One problem is programmed loading. Naturally, if you are not currently using programs in your current keypunch operations, you will probably not be interested in this area, but if the survey of your uses which we recommended did turn up substantial use of complicated programs, this may outweigh all the other factors and make the IBM Model 50 the best buy for you.



Honeywell Keytape unit which produces computer tape

The problem lies in the fact that in most units the program has to be keyed in from the keyboard and cannot be created once and then stored, as in standard keypunch operations. This can lead to uncertainty and mistaken input of the program.

IBM has provided a punched card program drum for up to eight different programs. And IBM's designers have used their ingenuity to avoid forcing you to have a keypunch to create the program cards. Instead they are providing portapunch cards, similar to the ones used in multiple-choice examinations, for the work.

Mohawk now allows a program to be written on a piece of tape, which is read in at the start of the run. Currently no other unit provides for the use of stored programs, although probably others will have some method similar to the Mohawk one in the near future.

TLW COMPUTERWORLD CORNER.

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Item 2: NCR 315 Banking System: 10K SLAB, 2 CRAMS on line MICR sorter reader, 680 LPM printer with buffer.

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Item 3: IBM 360/20 with MFCM, type 2203 printer. Available 8/1/68.

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Item 4: IBM 360/40 with disc and tape to be installed Oct. of Nov. '68.

Item 5: IBM 1406 Model 2. Additional storage needed immediately.

Item 6: IBM 1403 Model II Printer Needed Immediately

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Will Embezzlers 'Begin to Flourish'?

(Continued from Page 4)

3. These circumstances include:
   - a. Failure to adopt new audit techniques to cope with modern equipment.
   - b. Tendency to accept computer reports at face value.
   - c. Paper flood that evokes a "crisis" or "get it done somehow by Tuesday" atmosphere.
   - d. Need for higher management to familiarize itself with computers' abilities and failings.

I also submit certain defenses against it including:

1. Crash audits of program decks to see if the programs are doing what they are supposed to — and not concealing any hidden routines.
2. Upgrading of computer clerical staffs, since the work requires a higher level of intelligence and interest.
3. Crash hand checking on a random basis of such liquid output items as mutual fund benefit checks by a team of clerks to see if the sums printed add up to the computer total.
4. Company program to overcome the computer mystique among personnel, so that the company controls the computer, not vice versa.

I would like to close by thanking you for the opportunity to state my position as I have found all the commentary on this matter in your publication to be both fair and interesting.

[redacted]

Firm Accepts Control Of Operating Systems

MINEOLA, N.Y. – A new service is available to users of third generation computers who are experiencing ever-growing expense in time and money installing and maintaining computer operating systems. The service, called Syscon, provides control of operating systems on a sustaining basis. It was designed by Computer Procedures Corp. to relieve firms of the problems created by the implementation of manufacturer-developed software.

Syscon is directed toward the control of operating systems, to provide a measure of safety in the unprotected area between a system developed by a manufacturer and its utilization in normal operation. Ordinarily responsibility for this area falls on the user, at considerable expense and effort expended in operations quite apart from the demands of the installation programming.

Computer Procedures' Syscon system control service assumes this responsibility. Companies are assured that their operating systems will be consistently available and will function at the most current level, permitting the user to take advantage of all manufacturer improvements.

Syscon, in effect, is a "system staff" that is consistently available to provide continuity of operation.

Doctors Services

PRINCETON, N.J. – A Management Services division that will provide business and administrative counselling for individual physicians and multi-doctor groups has been established by Systemedics, Inc.

The new division will offer practice management services, systems design, office efficiency studies, personnel utilization and assignment, scheduling, and additional services necessitated by the personal requirements of physicians.

The company also will advise multi-doctor groups and doctor partnerships on methods of sharing and distributing income earned from their joint practice.

Utility Bureau

OTTAWA, Ontario – Control Data Canada, Ltd., a subsidiary of Control Data Corp., has opened a data processing service center here. This is CDC's first expansion into Canada of the company's information processing service.

The Ottawa Data Centre is presently linked directly to a CDC 3600 computer system in Boston, Mass. When required, high speed communications provided by a Bell Telephone Telpak transmit customer data from a CDC computer system here. This transmission is accomplished at speeds up to 40,800 bits of information per second. The processed data is returned to the Ottawa Data Centre at similar speeds, and printed out on a 1000 line-per-minute printer.

S-W Installs IBM 360/40

Orders and Installations

Sherwin-Williams Co., Cleveland, producer of paints, containers, and chemicals, has installed an IBM System/360 Model 40, "to make sure we always have the right type and color of paint on hand and in the proper quantity," without the need of taking a physical inventory. Riegel Paper Corp., New York, has installed a System/360 Model 40, to process data sent from 14 Riegel locations in a new teletype network.

Ling-Temco-Vought Corporate Computer Center, Arlington, Texas, has installed an IC-6000 computer, leased from Standard Computer Corp. (SCC), Santa Ana, Calif. The integrated circuit computer is designed to run applications from second generation IBM 704, 7090, and 7094 computers in Fortran language, at third generation speeds, without any reprogramming.

Computer Bureau, Shannon, Ireland, international keypunch center, has installed a Honeywell 120 computer system to improve its capacity to process documents flown in from the United States. Gore Mutual Insurance Co., Ontario, Canada, has installed a 120 to improve customer service in the auto insurance field. A.R. Winarick, Inc., New York, has installed a 120 to keep track of its 1500-item line of cutlery, cosmetics, and toiletries.

Dynair Electronics, Inc., San Diego, television equipment producer, has installed a Univac 9200 system to be used for inventory control, sales forecasting, job cost analysis, payroll, and personnel records. Eversman Manufacturing Co., Denver, farm equipment manufacturer, has ordered a 9200 for use in general accounting, inventory control, and production control. Arapahoe County School District Six, Littleton, Colo., ordered a 9200 to be applied to payroll processing, inventory control, grade reporting, and preparation of instruction cards.

Staiger's Department Store, Springfield, Mass., has ordered an NCR Century 100 computer. The system, scheduled for delivery later this year, will replace punched card equipment. Primary applications will be sales analysis and payroll for about 1500 employees, with accounts payable and inventory control to be added later. Input to the Century 100 will be largely by punched paper tape produced by NCR sales registers.

Migros, a chain of supermarkets in Switzerland, has awarded a contract to ICT, London, for six 1902A 16K central processors with disk and tape storage and optical readers. The machines will be used at six separate centers to prepare afternoon orders for overnight delivery from the warehouse. Delivery of the first machines will be December 1968 and subsequent deliveries will be spread over 1969-70.

A Honeywell Model 120 computer system has been installed at both the Detroit and Montreal divisional offices of Allied Chemical. The systems will be used initially for accounting, inventory, and payrolls. The Model 120 in Detroit replaces a punched computer card system. The installation in Montreal replaces a Model 360/30.

The first of six prototypes of an advanced design, dual magnetic tape transport system has been delivered to the U.S. Navy's Fleet Ballistic Missile program by Potter Instrument. The prototypes are undergoing extensive environmental and other testing to the rigid specifications required for operation in electronic data processing systems aboard the Navy's missile firing submarines. The Poseidon magnetic tape transports contain more than 1000 micro-integrated circuits per system with each system being completely redundant for added reliability. The transports also possess diagnostic routine capability.

Government Contracts Won by Three Companies

CONTRACTS

Contracts totaling more than $827,000 have been awarded to EPSCO, Inc., Westwood, Mass. One, from the Army Missile Command for modifications to Mobile Target Tracking Systems, was valued at $325,000. Another, worth $349,000, was for spare parts for synchro data converters for the Naval Air Systems Command. A new contract for measurement units for Kelly Air Force Base, Texas, was for $76,431. A new contract totaling approximately $77,000 for analog-to-digital conversion in anti-submarine warfare units for the Navy's ANEW program also has been received.

A contract to assist the Navy in maintaining and increasing the combat-effectiveness of the Navy's shipboard computer-based command system has been awarded to Computer Sciences Corp. The value of the award is expected to approach $6 million over a five-year period. The initial contract is for $3.5 million over a three-year period with provision for two one-year extensions. Computer Sciences will provide extensive contract support to the Navy Fleet Computer Programming Center at San Diego for the maintenance and further development of the Naval Tactical Data System (NTDS). In this system, computers aboard ships of the fleet are integrated into a world-wide tactical command-and-control system for the detection and interception of hostile forces. Each ship in the NTDS system has immediate access to all of the tactical data accumulated by other ships in the fleet.

A contract to assist in the study of the adaptability of helicopter cargo delivery from ships or depots to remote distribution points, such as Vietnamese jungles, has been awarded to Planning Research Corp., Los Angeles, for the Military Sea Transportation Service. Cargo will be carried in large containers (about 1280 cubic feet) suspended from helicopters. The company will develop operational and cost-effectiveness criteria for use in the selection of contractors to design ships, containers, and helicopter modifications and will also participate in cost-effectiveness analyses of the bids submitted.

Univac Adding Offices, EDP Center

Expansions

PHILADELPHIA, Pa. – Univac is acquiring 86,000 square feet of additional space for administrative offices and a new computing center in Blue Bell and Norristown, Montgomery County.

From its original plant in Philadelphia, Univac moved into a new engineering center in Blue Bell in 1961. Two additions to this new wing, housing the company's World Headquarters, which was completed in 1966.

The present Philadelphia area facilities, not including the planned expansion, total 550,000 square feet.

Larger Office Planned

PRINCETON, N.J. – A new 10,000 square foot, two story building in the Princeton Air Research Park here is being built for Systemedics, Inc., specialists in computerized medical systems.

The air conditioned building will serve as headquarters for more than 50 of the firm's executive and administrative personnel.

The airport site is important to Systemedics because the company uses its own private aircraft for trips to field offices and to quickly service clients throughout the country.

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Eight Honeywell Employees Cited for Contributions

WELLESLEY HILLS, Mass. – Eight Honeywell employees have been cited for major technical contributions to the company during 1967.

They were given H.W. Sweatt Engineer-Scientist Awards by Stephen F. Keating, Honeywell president.

The winners are:

Theodore Chen, senior engineer, EDP Technology Center: cited for developing a family of electronically alterable read-only memory units.

James B. Geyer, staff analyst, EDP Technology Center: cited for initiating and helping implement a 30-to-1 decrease in time required for the Model 8200 computer to process an information request with more efficient memory utilization at no increase in product cost.

Thomas F. Joyce, engineer, EDP Technology Center: cited for helping develop sophisticated multiprogramming features for the Series 200 computers.

Ming-Tzer Miu, senior engineer, EDP Technology Center: cited for contributions to the unique system design and logic implementation on the 4200 computer to make it program-compatible with smaller members of the Series 200 computer family.

Joseph E. Monahan, engineering section manager, Computer Control Division: cited for the invention of a fast recovery delay multi-vibrator and novel high speed, bi-stable memory circuit.

Harold M. Shneider, staff engineer, EDP Technology Center: cited for designing, building, and developing a high speed print hammer made with fiber glass reinforced plastic flexure springs.

John E. Thron, computer systems engineer, Computer Control Division: cited for his contributions to the design of the new H-632 digital computer and for doubling the computer's computational speed without circuit changes and at a minimum cost increase.

Loring C. White, senior principal research scientist, Radiation Center; cited for development work on subminiature infrared detector arrays.

Multi-Lingual Computer Adapts Itself to Problem

LOS ANGELES, Calif. – Details of the new IC-6000E which has been designed for university computer users (see page 1) show that there are a number of unusual features in the system, as could be expected when the function of the system is to allow researchers to create specially tailored "computers" for their own particular purposes.

The heart of the system is the ability to change the instruction code of the machine itself, and to do so quickly. The instruction code of the IC-6000E is held as a micro-program in a 500-nanosecond control memory. The code, called the Miniflow by its originators, is not unlike a very basic assembly and is used to define user-made instructions. This code uses implied addresses, registers, and bit positions but does not directly access main memory addresses. An example of a possible type of operation, called Float (see table), has been estimated by Standard Computers as being capable of twice the speed of other large-scale binary systems.

A similar but separate flexibility is a programmable input-output and interrupt system which allows the characteristics of different input/output controllers to be integrated with the program as needed.

When the system is delivered it already will have a number of different computer languages already programmed. These include the IBM 7090/7094, 7040/44, and 1130 codes, thus enabling users to utilize directly programs which run on those systems; and two machine languages, that of the IC-6000E itself and that of another Standard Computer system, the IC-4000. This latter machine language is currently being developed, and is a Fortran optimized language which is claimed to allow the machine to outperform computers costing twice the price of the Standard IC-4000.

However, it is expected that the major impact will be in areas where the system is used with new machine languages designed for a particular purpose by users.

Changing from one machine language to another is currently handled simply by reading in the new program from a special tape reader on the console. This takes under a half-minute, and could be speeded up if necessary.

In general, many of the approaches in the actual hardware are similar to those taken in the micro-programming logic of the System 360. The major difference in the hardware part of the system is that the Miniflow language is much more easily understandable than the intricate 360 micro-programming system. The other difference so far as users are concerned is that any changes in the 360 micro-code are frowned upon by IBM, and may invalidate the agreements between the user and that company; whereas in the case of the IC-6000E such changes are exactly what the user is expected to do with his system.

Miniflow System In Action

Example of the
Inner-Computer Language

The micro-program below converts a 12-bit fixed point number to floating point. In main memory of the IC-6000E this would be represented by one instruction, e.g., Float.

```
                        Float
PE      B, 00-33        TEST FOR AC ZERO
TAE     NC              EXIT IF ZERO
PD      ZERO            CLEAR O
SHIFT   BD-R, 9         MAKE ROOM FOR EXPONENT
SHIFT   D-R, 9          CHANGE TO FLOATING FORM
LIB     20,00-02        LOAO EXPONENT BASE
SHIFT   BD-N            NORMALIZE THE MANTISSA
LIB     44, 03-08       LOAD EXPONENT SCALE
RC      LOC, 00-08      LOAD NORMALIZE COUNT
PB      B-C, 00-08      ADJUST THE EXPONENT
AC      B, 5, EXIT      RESULT TO AC AND EXIT
```

The execution time for the above sequence is 15 microseconds.

Designing a Computer With Miniflow System

The Miniflow Design Process

In order to design a different computer, one has only to change the Miniflow system; i.e., a program resident in control memory. For each instruction in the program of the target machine, the inner computer executes a routine or group of routines, made up of mini-instructions. For each input or output operation and each console function to be performed, the inner computer executes a similar set of routines. These routines are stored in the control memory of the inner computer. They are entered from the wired-in sequence which is controlled by a control and transfer vector in the Miniflow control memory. The entire collection of routines present in the control memory at any one time is called a Miniflow system. It is the Miniflow system which tells the inner computer how to interpret the machine language instructions of the target machine.

The General Control Sequence

Very briefly, when a "request" is set, the scheduler passes control to the wired-in-sequence which in turn passes control to Miniflow execution. When the Miniflow is completed, control is returned to the scheduler.

Specifically, when a program request or an external interrupt (such as console request, real-time clock, etc.) is honored by the scheduler, control passes to the wired-in-sequence. At this time, an instruction from main memory is brought to the main engine. The operation code portion of the instruction is sent to the translators which generate an address pointing to a control or transfer vector in the control entry table. The Control and Transfer Vector provides a Miniflow starting address and controls these wired-in-sequence options:

1. Indexing and indirect addressing of the instruction address
2. Fetching an operand from memory
3. Treating the instruction as a transfer

The starting address of the Miniflow routine is sent to the program sequence counter in the mini-engine. The address portion of the instruction may be modified by the index registers and indirect addressing. An operand may be brought from main memory and the accumulator is put into the main engine. The Miniflow program is then executed. When the Miniflow program is finished, it returns control to the scheduler. The process is then repeated as the scheduler honors the program request again.

Students at Miami-Dade Junior College check out books at one of the college libraries. The librarian inserts each student's identification card and a book card into the terminal, foreground, and the college computer system keeps track of books on loan and issues reminder notices on overdue books.

System Links Campuses, Accesses Central Files

MIAMI, Fla. – Miami-Dade Junior College has adopted a time-sharing system which links the school's two metropolitan Miami campuses to a computer by private telephone lines.

Carrying information between the north and south campuses at the rate of 8000 words a minute, the computer solves both instructional and administration problems.

Already the fastest growing metropolitan college in the country, Miami-Dade, with over 23,000 students, also plans to tie the new system into its proposed $15 million mid-town campus, continuing the concept of serving all of its locations with one computer.

Theodore A. Koschler, vice president for administration, foresees the computer as the primary central resource in the school of tomorrow in the way the library has been and is today. He is already fanning out the computer's services into virtually every academic and administrative area.

From a center in the Science Building on the South Campus, the System/360 Model 40:

- Registers the student body four times a year.
- Checks books out of the dual 100,000-volume campus libraries.
- Issues report cards.
- Grades many of the tests given in the 3000 classes taught at the two campuses.
- Serves as a teaching tool for the 1200 students enrolled in the computer sciences curriculum.
- Produces control tapes for automated machine tools in the mechanical technology courses.
- Plays sophisticated management games with business students.

"The computer's most important mission is to aid in the learning process," Koschler said. With Miami-Dade gearing for an enrollment of 34,000 by 1970, he is already laying the groundwork that will make the computer as accessible on campus as the libraries and the laboratories.

Display Terminals

One of the newest developments is the appearance of display terminals, IBM 2260 display stations, at the Independent Study Center. Part of the $3.2 million Trammel Learning Resources Center on the South Campus, the Independent Study Center is an electronic tutorial system where students can learn with the aid of electronic devices.

Displays are now installed in the finance office and registrar's office as well. Others are scheduled to be installed in counselors' offices, and a "snapshot" of student records, with as many as 2000 characters of information, can be put on the screen for guidance sessions, course selection, and financial review.

Automation isn't new at Miami-Dade. Automated equipment first began to speed up registration lines in 1963 when enrollment was only a quarter of the 23,341 students it is now. Today the computer makes sure all fees are properly calculated, makes sure the student hasn't any conflicts in his schedule, and prints out the schedule automatically.

Library Check-Out

The computer has also produced the automatic check-out in the libraries. By inserting an ID badge and a book card into a computer terminal at the check-out desks, students can automatically borrow books from the library. If the return date is forgotten on a book, the computer sends out a reminder.

The computer is becoming a favorite subject for study at Miami-Dade. The college rates "Electronic Data Processing" as one of its top two glamour courses, along with "Career Pilot Training," and runs classes continuously between 7 a.m. and midnight.

Miami-Dade opened in 1960 with 1428 students and without a square foot of its own classroom space. Its two campuses now cover 430 landscaped acres and its educational facilities on these campuses, when fully developed, will represent a $44 million institution.

Mountaintop Airport Challenges Computer

AEC President Rufus King checks computer generated recommendations for an airport expansion.

WASHINGTON, D.C. – How do you economically extend the runways to accommodate the new short range jets when the airport is on a mountain top?

After looking at all the feasible alternatives, a $5 million extension to an existing runway, from 5600 to 6500 feet, was proposed as the least expensive answer – even though it meant extending the mountain.

Airport design problems like this are being tackled by Airways Engineering Corp. (AEC) here with the aid of a computer. Passenger loads will double by 1973, with the advent of jumbo and supersonic jets, and the planning must be done now.

AEC President Rufus C. Phillips, III, said, "With the computer, we can design tomorrow's airport master plans today. We believe it is the first time a computer has undertaken design studies for 41 airports over the past 10 years, 20 of them international airports.

The IBM 1130 computer, linked directly to a plotter, used as an automated drafting table, has already produced a study for the mountaintop Kanawha County Airport, Charleston, W. Va.

The computer was used to study the man-made plateau for expansion room, analyzing three possible runway orientations.

AEC's computer is also providing structural design calculations for control towers, hangars, and cargo facilities for the new Jeddah and Riyadh International Airports in Saudi Arabia.

With the number of persons using airports expected to double in the next five years, AEC has also looked ahead to the alternatives for passenger handling systems at Dublin International and the New Tokyo Internationl Airport, at site requirements for Manila International, and for a new airport to serve New Orleans.

Phillips estimates there are upward of 600 design steps involved in planning a modern airport. AEC has thus far used its computer to:

Create wind roses (graphic designs of prevailing wind conditions) from analyses of up to ten years of weather data. Wind roses are required to position runways to secure maximum wind advantage.

Locate runways and taxiways in the safest, most economical position and automatically generate the engineering profile and cross-section drawings used by contractors in actually laying down the runways.

Determine the size and the facilities needed at an airport, based on mathematical models of projected passenger loads.

Currently under development at AEC are these uses for the computer:

Architectural space planning and design.

Simulation of traffic flow (both ground and air traffic) as the basis for developing the most efficient air terminal layout and passenger handling and ground transportation systems.

Site analysis, with obstructions that might possibly surround a new airport automatically plotted from aerial photographs through the use of digitized terrain models.

"Airport design has generally been an all-or-nothing proposition," Phillips said. "The cost of examining many alternatives has been prohibitive. But now, with the computer, that has all been changed. Now, recommendations which would have taken months, or perhaps have been impossible to develop before, are available to our clients within a few weeks' time."

The computer is also changing airport design by enabling more variables to be taken into account. "We can ask the computer, 'What if–,'" Phillips said. "For example, what if the new jets increase international traffic at an airport by 50, 100, or 200 per cent; what will it take to provide adequate customs, immigration, and quarantine facilities, and how much will it cost?"

The ultimate advantage of the computer, in Phillips' estimate, is that it will enable the building of airports with "optimum design at minimum cost – airports from which passengers don't lose the time in getting to their destinations on the ground, that they saved in the air; and airports that can readily and economically expand to meet the demands of the continuing boom in air passenger and air cargo transportation."

Phillips believes that "the computer will inevitably become the design partner in the planning for all major airports and that it must play a major role in helping to shape airports of the future if they are to operate as smoothly functioning cogs in a mass transit air system."

Planners Simulate Sewer Systems

PORTLAND, Ore. – Portland's department of public works is using a computer to make plans for the 21st Century – from the ground up.

The department's bureau of design is simulating the growth of Portland's sewer system, block by block, through the year 2000.

With this information as a basis, the city can predict, for example, what impact a proposed factory at a particular location would have on the sewer system or determine in advance the sewer requirements for a builder planning a major development. The simulation is more than two-thirds completed.

Oregon's largest city is already benefiting from the study, according to Ray Cruden, chief of the bureau of design.

"Many times we're asked to recommend to a planning organization which way sewage should be routed," Cruden explained. "With the computer we can investigate several alternate plans and determine a course of action that is not only best now, but best for the years to come.

William Hege, chief of the research and planning division, described a public housing project as an example. "Given the number of units and the number of people who will live in them," Hege said, "we can use the computer to tell the housing authority the probable sewerage cost."

The IBM 1130 computer was fed information on sewer flow, line sizes, roughness of the pipe's interior, and the grade of each section. Population and industrial growth, estimated for the various sections of the city, were added in, based on statistics from metropolitan, county, state, and national agencies.

When city officials first saw the far-distant projections, some were understandably concerned about their accuracy. A simple experiment allayed their fears.

"We programmed the computer using this same basic information but with 1908 as a base instead of 1968," Hege said. "Then we projected our needs forward to 1966. When we checked its conclusions against the actual records, we were simply amazed at the accuracy."

Bank Uses Time Sharing for Analysis

ATLANTA, Ga. – The Trust Company of Georgia, the first bank in the Southeast to contract for General Electric's time sharing service, expects the system to help financial analysts forecast the growth of industries and companies throughout the United States, and to provide other investment data.

With a teletypewriter terminal in the bank's Investment Analysis Department, access to the central computer facility is almost instantaneous, enabling analysts to work on many investment problems practically at their own desk.

"With this sytem, we will be able to compute very rapidly many statistical measures of significance which will aid us in interpreting data under study. We can also quickly calculate the effect of stock and bond price changes on our judgment of the securities attraction," Valjean B. Brookshaw, Jr., supervisor of the Security Analysis Division, said.

"Through the combination of vigorous and continuing post-graduate study in quantitative techniques by our professional staff and access to the computer, we expect to improve our forecasting capacity and sharpen our ability to detect favorable or unfavorable stock price relationships."

The application of this particular computer system to the bank's Investment Analysis Department as a research and problem solving device is distinct from the already highly developed data processing application made in other departments of the bank.

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Airline Reservation System Installed

LOS ANGELES – Continental Airlines this month inaugurated a $7.2 million computerized reservation service. Called Sonic (systemwide on-line network for information control), it will serve Continental passengers from four centralized offices.

First of the offices to use the system is Los Angeles, which also provides reservation service to Continental passengers in Tucson, Phoenix, and El Paso. Centralized reservations offices in Denver and Houston will be on-line by the end of June. Chicago will join the system in late summer.

Sonic, based on two IBM 360/65s, is capable of processing, integrating, and maintaining detailed reservations records for up to half a million passengers at any one time. It can be expanded, when needed, to more than a million. Each computer has a memory cycle of 750 nanoseconds.

Back-Up System

One of the duplexed computers is dedicated solely to processing of reservations information. The other, also available on a 24 hour a day basis to serve passengers throughout the airline's route system, primarily provides back-up support but also is being used to prepare a wide range of management reports, do general data processing, and test new functions.

Passenger reservations files are maintained by the computer in two IBM 2314 units, each containing eight disk modules. Information can be retrieved by the computer and communicated to a reservations agent in about 75 milliseconds.

Records to assist in speeding reservations service to passengers will also be maintained on 12 IBM 2401 Model 2 magnetic tape units.

More Than 400 Terminals

Continental's real-time reservations system will use more than 400 computer communications units when complete.

In the four centralized reservations offices, 290 IBM 2915 airline reservations CRT terminals will enable agents to service passengers.

Sonic will use 120 IBM 1977 airline terminals, installed at departure locations and in other areas where a printed, permanent record of transactions is required. They will be used, for example in flight kitchens to determine from the computer the total number of first class, tourist, and economy passengers on flights, providing greater accuracy in ordering beverages and meals.

Management and balancing of Sonic's four centralized reservations offices and main computer center is maintained by the system's Central Reservation Control (CRC) in Continental's Los Angeles headquarters.

The CRC, equipped with ten 2915s and two 2977s, is responsible for:

Monitoring passenger traffic activity across the airline's entire domestic route system.

Managing unusual occurrences, including advising local reservations agents to contact passengers holding space on a flight which may have been delayed, or an extra section scheduled.

Central Reservation Control Room for the new Continental Airlines Sonic system.

Terminal connected to Continental Airlines' new Sonic reservation system enables clerks to confirm reservations, check flight status, select seats, and reserve space on connecting flights.

'Hidden' Computer Works on Sea Mysteries

WOODS HOLE, Mass. – A computer hidden inside a century-old Cape Cod house has begun helping scientists to understand some of the mysteries of the sea.

Installed recently at Woods Hole Oceanographic Institute here, the SDS Sigma 7 computer is working on problems that include distribution of fish in the seas, mapping the currents of the ocean, and analyzing chemical and geological data.

Data from the institute's ocean-going ships and from many electronic buoys moored in the oceans are returned here for analysis by scientists. The computer allows researchers to reduce this data to understandable proportions and to compare highly complex relationships.

The institute is located in a number of buildings spread throughout a maze of narrow streets, coves, and docks on a spit of land that juts from Cape Cod into the Atlantic. Space is at a premium in the area. Several large modern buildings and a number of frame houses comprise the facilities available to Woods Hole scientists.

When space was required for the new computer, the institute elected to convert a handsome old frame dwelling to house this new facility. Clearly, the old timbers and wiring in the ancient building were unsuitable for a heavy and power hungry third generation computer. Institute officials did not wish to change the appearance of the neighborhood, so the inside of the building was opened up, the floors shored up with steel beams, air conditioning installed, and heavy duty electrical circuits brought in.

From the outside, tourists see little difference between the new data center building and the old church next door.

This century-old Cape Cod house has been converted into a computer center for the Woods Hole Oceanographic Institute without spoiling the structure's appearance.

Optical Scanner Speeds U.S. Messages

WASHINGTON, D.C. – An advanced optical scanning system used to convert printed information to computer language is being used by the Department of State to speed up processing of messages sent to U.S. missions overseas.

The Control Data 915 page reading system has been installed in the State Department's Communications Center. The system provides automatic message input to the department's diplomatic telecommunications system for transmission to U.S. embassies, consulates, and other foreign offices in over 100 countries.

The reader scans messages prepared in various State Department offices with a high intensity light, converting characters into electrical impulses. The new electronic code is recorded on paper tape by a CDC 8090 computer system at the rate of 1200 words per minute. The punched tape is then sent to an automatic terminal station for transmission.

The system replaces slower, manual paper tape preparation and reduces the chances of error in message processing.

A video display is used to correct unreadable characters. Words containing characters the reader cannot identify appear on a Control Data 8049A entry display station. An operator makes the correction on a keyboard mounted below the screen.

In addition to producing punched paper tape, the system arranges such information as message classification, addresses, and reference number for delivery to the automatic terminal station.

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H-200 20K system with 900-lpm printer, 4 44KC tapes available Nov. 1, 1968.
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Sicgraph Adds Reports On Graphics Research

PROVIDENCE, R.I. – A series of research reports has been added to the ACM Special Interest Committee on Graphics (Sicgraph) newsletter as a means of reducing the number of times the wheel is being re-invented in this area. The initial series of reports includes data from Brown University with an IBM 2250 Mark I being upgraded to an 1130 with a Mark IV next year. Work here includes an on-line, interactive system for programmers that provides flow charting facilities while the program is being written.

Flowcharts as Input

An interesting approach to flowchart use in the same system is to use a flowchart as the input, and to generate the appropriate machine program from it automatically. In this instance, the flowchart can be in Fortran or in assembly language, and the program will be generated in the same language.

Other work at Brown includes a Data Structures Programming System which allows data structures to be modified and referenced. One particular application the authors see is providing a browse facility based upon generalized instructions; and a three dimensional piping design system.

Flowcharts as Programs

The University of Illinois is also working on having flowcharts constructed on the display unit and transmitted for immediate execution on a large computer. In this case the display is Digital Equipment's DEC 338, at a remote site, connected by phone lines to the ILLIAC II, and shortly to a 360.

Algorithms for light pen tracking and stereo viewing for cases in which the function needed is simply to know which line is in front of which are also given.

Sicgraph is open to anyone, whether or not he is a member of the ACM. To join (there are no dues) write to A. van Dam, Brown University, Providence, R.I. 02912.

Galler Picks Canning for AFIPS Post

BOSTON, Mass. – Dr. Bernard Galler, the new president of ACM, made the traditional appointment of the loser of the presidential race, Richard G. Canning, as one of the four ACM directors on the AFIPS committee and as its representative on the AFIPS executive council. Canning, who accepted the appointment, issued a statement calling on ACM members to support Galler and ACM's programs, as well as thanking the many members who voted for him.

Galler also issued a statement thanking the members and commenting on the need to communicate better with the membership.

In the meantime, the ACM Council met at Logan Airport, Boston, and passed a budget which, with one major modification, would allow the recommendations of the executive committee to be implemented. The one major modification came in the discussion of the proposed news publication. It appeared that the suggested program for the publication in detail had not been presented to the council in writing and therefore the council requested that the editorial board prepare and present such a document in August.

The meeting was very much quieter than the preceding one in Atlantic City, partially perhaps because of its location in the airport motel here. Details of the voting were not made public by ACM in conformance with the tradition of the society.

Statement by Dr. Bernard Galler.

I appreciate the support of the ACM membership. I learned a great deal during the last administration on how to communicate better with our members, and the importance of this communication, and I certainly hope to expand this and develop ACM activities in accordance with our needs and theirs.

Statement by Richard G. Canning.

Dr. Galler will be our ACM president for the next two years, and I for one intend to give him all the support I can.

In the past, much has been made of the chasm between the engineering and scientific segments on the one hand, and business segments on the other. Technologically, this chasm is diminishing. For instance, engineering and scientific users are tackling the problems of data management, while the business community is making increasing use of quantitative models. Each can learn from the other. To many it seems very important that ACM's programs assist in pulling these two segments of the field closer together through adequate support of each.

My sincere thanks to the many ACM members who voted for me. I hope they will join me in supporting and fostering ACM's programs during the next two years under the leadership of Bernie Galler.

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Antitrust Investigation Of Software Is Urged

NEW YORK – The Justice Department has been urged, in an article in the *Columbia Law Review*, to give serious consideration to the possibility that antitrust laws are being violated by computer manufacturers who give away software. The article lends support to the argument being put forward by Applied Data Research and other software houses that the practice is a breach of antitrust laws.

David Bender, the author, points out that the argument that the hardware will not function without the software is irrelevant, that if this is true the consumer would soon find out about it, and the hardware manufacturer would not need the protection of the tie-in. He also points out that this specific point was used by the U.S. Supreme Court in striking down IBM's tying of its data processing cards to the rental of its machines, more than 20 years ago.

Quoting Justice Frankfurter that "tying agreements serve hardly any purpose beyond suppression of competition" and that "they are unreasonable in and of themselves," Bender points out that the tying practice is responsible for a substantial market effect as the software houses have been prevented, by tying, from handling a very substantial volume of system software.

On the other hand, he quotes two cases where tie-in practices were approved. In one, that of a silo manufacturer who refused to install his equipment except where he had built the silo itself, it was pointed out that he had only come to this decision after a number of installations with competitive installations had been unsuccessful. In the other case, involving community antenna TV, there simply was no other reliable firm to service the sets.

The article, "The Patentability of Computer Programs," recommends that a search committee should be established to devise a method for searching for programs. This committee should include representatives of software houses, hardware manufacturers, and the government, and hopefully its findings would allow intelligent recommendations for patent protection to be made.

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Automatic Flow Chart

This flow chart was automatically produced by the CalComp Flowgen/F program. It allows basic Fortran statements to be processed without source deck modification. This allows the source deck to be as free-form as the Fortran compiler will permit. Flowgen/F facilitates modifications to the program, standardizes flow chart documentation and provides automated flow charting. It is available for a one-time charge of $4500.

MIS for Insurance Firms Developed

MINNEAPOLIS, Minn. – A complete management information system for life insurance companies has been announced by the National Cash Register Co.

The new program, called Impel (insurance management performance evaluation, life), is designed for use with NCR's Century Series computers.

"Impel is a dramatic departure from the practice of superimposing electronic capability upon a conventional insurance accounting structure," said Owen B. Gardner, the company's vice president of industry marketing.

"It defines the informational requirements of management and uses electronic techniques to meet them, unimpeded by departmental boundaries."

The new package program assists management in four vital areas, Gardner said. These are corporate planning, setting specific long term and short term goals, managing company operations, and performing basic accounting functions.

Because the system is designed to function with the NCR Century 100 as well as with larger members of the Century family, establishment of a management information system now becomes feasible for smaller companies previously unable to justify a computer, Gardner said.

The basic Century 100 configuration required includes a central processor with a 32K memory, disk units with a capacity of 16.8 million characters, a printer, and a card reader.

Payroll Programs Now for Sale

MT. KISCO, N.Y. – Computer Usage Business Services has announced that its payroll package, previously sold only as a service, is now for sale as a total package.

The package, which can handle multi-state tax problems, can process shift differentials, temporary rates, and multi-pays as a normal routine. The preparation of an employee's earning record card whenever the user requires or needs it is included in the program. Both hourly and salaried personnel can be processed at the same time.

calendar

June 13-15, Atlanta, Ga. – ACM Seventh Annual Southeastern Regional Meeting. Contact: ACM, Dinkler Plaza Hotel, Atlanta, Ga.

June 23-28, Hanover, N.H. – 1968 Hanover Management Services. Contact: Computer Environment Corp., Hanover, N.H.

June 24-25, Tuxedo, N.Y. – "The Retailer and Today's Management Technology." Contact: James J. Bliss, National Retail Merchants Association, 100 W. 31st St., New York, N.Y. 10001.

June 24-26, Arlington, Va. – "Computer Operations Management and Control." Contact: Brandon Systems Institute, 1611 North Kent St., Arlington, Va. 22209.

June 24-28, Los Angeles, Calif. – "Bio-Engineering Applications of Analog Simulation." Contact: Director, Education and Training, Dept. 10-17, Electronic Associates, Inc. P.O. Box 582, Princeton, N.J.

June 25-28, Washington, D.C. – DPMA International Data Processing Conference and Business Exposition. Contact: Miss Margaret Rafferty, DPMA, 505 Busse highway, Park Ridge, Ill. 60068.

COMPUTERWORLD financial

NCR Acquires 90% of Argentine Business Machines Company

DAYTON, Ohio – The National Cash Register Co. has acquired a ~~90%~~ interest in Ultra Argentina Sociedad Anonima Industrial y Commercial, a Buenos Aires business machine company. Cost of the transaction with Swiss and Argentine stockholders was not disclosed. The remaining 10% will continue to be held by Raul Carlos Ferraro, an Argentine who has been an officer of the firm and will continue on as a board member.

The Ultra Argentina 26,000 square-foot plant, which employs 250 persons, joins two other NCR South American manufacturing facilities. NCR's Brazilian plant, at Sao Paulo, contains 102,000 square feet and employs 325 persons. The company's recently opened Maxican plant, at Puebla, contains 50,000 square feet and employs 100.

Leasco Still Undecided About Position in Reliance Insurance

GREAT NECK, N.Y. – Leasco Data Processing Equipment President Saul P. Steinberg says the recent activity of Reliance Insurance stock does not involve any current action of Leasco, although it may reflect "what people think our future actions will be."

Reliance hit a 1968 high of 58-1/2 on the day preceding Steinberg's statement. The data processing firm owns 3% of the common shares of Reliance.

According to Steinberg, Leasco's future position has not yet been determined.

Tally Plans Acquisition And Sells $6M in Stock

SEATTLE – Tally Corp. has announced the sale of 190,000 common shares and plans to exchange more shares in order to acquire another company.

Kidder, Peabody & Co., New York, handled the transaction which involved four major institutions and stock valued in excess of $6 million.

Russel C. DuBois, president, said the proceeds of the sale will be used to "retire the company's current outstanding line of bank credit and to provide working capital for planned future growth and expansion."

DuBois also said that there is a better than even chance that Tally will complete an acquisition of a publicly owned company in the next 60 days through the exchange of stock.

DuBois estimated that the proposed acquisition could add another $7 million to Tally's annual volume and approximately $600,000 to earnings. Estimates for earnings for the current year, which exclude acquisitions, run slightly under $1 million or about $.55 to $.70 per share. This compares with a year earlier net of $268,000, or $.18 per share. Sales for the current year are estimated at $11 to $12 million. DuBois also expects fiscal 1969 sales, excluding acquisitions, to be about $18 million and earnings about $1 per share.

Bunker-Ramo, Amphenol Merge; Stock Active

NEW YORK – The merger of Bunker-Ramo Corp. and Amphenol Corp. to form a new Bunker-Ramo Corp. has produced an active new stock on the New York Stock Exchange.

The merger, approved June 3, involved the exchange of stock by shareholders of both companies for stock in the new company. The day following the merger, Bunker-Ramo was listed on the New York Stock Exchange for the first time after having been on the American exchange, where it was the most active stock on its last day of trading there.

During its first week on the Big Board, the stock dominated the most active list. On the first day of trading, which was also the third most active day for the New York exchange as a whole, Bunker-Ramo was fourth most active, and gained 1/8 to close at 16-1/8. The next day the stock waa the third most active and gained 1-1/4 to 17-3/8. On June 6 some 329,400 Bunker-Ramo shares changed hsnds making it the most active stock on the NYSE. The stock gained 1-5/8. Amphenol and Bunker-Ramo last year had combined sales in excess of $230 million and earnings of $8.4 million. Amphenol is a manufacturer of electronic components, knitted fabrics, automotive instruments, and electronic signs. Bunker-Ramo, controlled by Martin-Marietta Corp., makes electronic display equipment, specialized computers, and operates a commercial data processing system.

Wallace Earnings Down; C-S, Sanders Increase

Earnings Reports

CHICAGO – Wallace Business Forms has reported decreased income on increased sales for the quarter ended April 30, 1968. Net income dropped 10%, from $449,000 in 1967 to $431,600 in 1968. Sales increased 6%, from $6,160,000 to $6,521,800.

Nine month figures show a 2% increase in both revenues and income. The company reported sales of $18,386,800 and income of $1,094,700 in the 1967 period vs. sales of $18,796,900 and income of $1,116,000 in the 1968 period.

NASHUA, N.H. – Sanders Associates has reported a 34% increase in net income for the quarter ended April 30. Net income for the latest quarter totaled $1,450,000 ($.32 per share) vs. $1,080,000 ($.29 per share) for the same period in 1967.

Sales increased 40% over the same period, from $36,600,000 during the 1967 period to $51,386,000 during the latest period.

Nine-month figures show a similar increase in sales and a slightly greater increase in earnings. Sales increased 44% from $92,400,000 to $133,000,000 while earnings improved 42% from $2,770,000 ($.73 per share) to $3,930,000 ($.88 per share).

The 1967 per share earnings figures have been adjusted to reflect a 100% stock dividend in July of that year.

LOS ANGELES – Operating results for the first six months ended April 30 have been reported for Computing and Software, Inc. by its president, Norman E. Friedmann. Net income for the period climbed 29%, from $476,000 ($.41 per share) in the 1967 period to $615,000 ($.52 per share) in the 1968 period. Sales inereased 16%, from $10,602,000 to $12,315,000.

Figures for 1967 were restated to include companies acquired subsequent to April 1967 on a pooling of interests basis.

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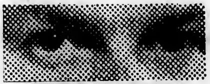

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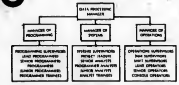

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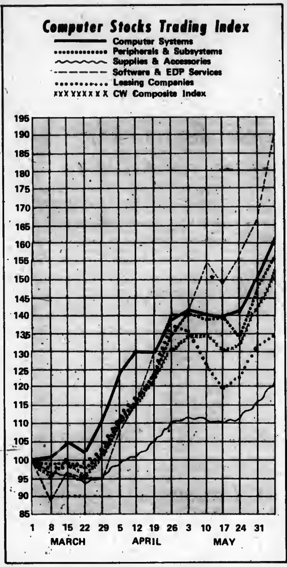

Dearborn, UCC, Make Big Gains

(Continued from Page 1)

was the only stock in the sector to decline. Collins dropped 4% to 66.

Ten stocks in the Peripherals and Subsystems sector rose more than 10% last week. Information Displays (IDI) led the sector with a 32% gain to 23-1/2. Bunker-Ramo followed with a 31% rise to 20-7/8. B-R merged last week with Amphenol and gained a listing for its new stock on the New York Stock Exchange. Alphanumeric rose 20% to 80 and now stands 281% above its March 1 base price. Calcomp rose 18% to 50-5/8 after setting a new high of 50-7/8. Gerber Scientific, Milgo Electronics, Mohawk Data Sciences, and Optical Scanning Corp., each jumped 15%. Computer Equipment and Digitronics both gained 13%. Biggest loser in the sector was Rixon Electronics, down 6% to 23.

Memorex led the Supplies and Accessories sector with a 17% gain to a new high of 83. Memorex had been the biggest loser in the sector the previous week but the biggest gainer the week before that. Reynolds followed with a 12% increase to 42. Ennis Business Forms rose 10% to 36-1/4 while Baltimore Business Forms and Wallace Business Forms each rose 9%. Wabash Magnetics led the losers in the sector after posting the second largest gain in the sector the previous week. Wabash lost 6% to 18-3/4.

The biggest loser and the second biggest gainer among computer stocks last week were to be found in the Software and EDP Services sector. University Computing led the gainers in the sector, rising 33% to a new high of 158. Scan-Data led the losers with a 20% loss to 100. Brandon Applied Systems continued to gain ground. BAS rose 19%, to 29-1/2, after having risen 25% in the previous week. The stock stands at 228% above its March 1 base price. Computer Usage, which had been below its March 1 base a week ago, rose 19% to 45. Other large gainers included Digitek, up 12% to 18-1/4; and Computing & Software and Informatics, each up 10%. Matrix lost 9% to stand at 20 on Friday's close.

Dearborn Computer's 38% jump to 47 led gains made by all computer stocks. Granite Equipment Leasing wasn't far behind with a 33% increase to 68-3/4. Other stocks in the Leasing sector making substantial gains included National Equipment Rental, up 13% to 49-3/4; and Cyber-Tronics and Data Processing Financial & General, each up 10%.

COMPUTER STOCKS: TRADING SUMMARY

AS OF JUNE 7, 1968

EXCHANGE	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE	COMPUTER SYSTEMS	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
NYSE	163 3/8	220–167	218 1/8	• Burroughs	+ 15 7/8	+ 7.84	+ 33.51
NYSE	67 3/4	161– 66	66	Collins Radio	− 3	− 4.35	− 2.58
NYSE	101 1/2	174– 98	170 1/2	• Control Data	+ 13 1/8	+ 8.30	+ 67.98
AMSE	103	160– 88	149	• Digital Equipment	+ 7 5/8	+ 5.43	+ 45.15
NYSE	87 1/4	100– 84	88 7/8	General Electric	+ 3/4	+ 0.85	+ 1.86
NYSE	38	60– 38	58	Hewlett-Packard	+ 6	+ 7.22	+ 48.33
NYSE	93 1/8	130– 88	130	• Honeywell	+ 12 1/2	+ 10.76	+ 40.38
• NYSE	288 1/2	375–288	370	• IBM	+ 13	+ 3.64	+ 28.25
NYSE	103 7/8	153– 98	153 5/8	• Nat. Cash Register	+ 8 5/8	+ 5.95	+ 47.90
NYSE	50 7/8	60– 38	50 1/8	RCA	+ 1/8	+ 0.25	+ 0.83
NYSE	70 1/4	107– 73	105	Raytheon	+ 1 5/8	+ 1.56	+ 49.46
OTC	22 1/2	60– 20	46 1/8	• Scientific Controls Corp.	+ 1 1/2	+ 3.31	+105.55
NYSE	118 1/8	172–108	163 7/8	• Scientific Data	+ 5 3/8	+ 3.39	+ 38.73
NYSE	45	63– 42	59 1/8	• Sperry Rand	+ 3	+ 5.31	+ 32.22
OTC	22 1/2	38– 20	39 1/8	• Systems Engineering Labs.	+ 3	+ 8.22	+ 75.55

EXCHANGE	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE	PERIPHERALS & SUBSYSTEMS	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
NYSE	68 3/8	91– 52	91	Addressograph-Multigraph	+ 6	+ 7.06	+ 33.09
OTC	21	80– 45	80	Alphanumeric	+ 13 1/2	+ 20.30	+280.95
NYSE	30	37– 28	34 5/8	Ampex	+ 1 3/4	+ 5.32	+ 15.40
OTC	17 1/4	67– 19	22 3/4	Bolt Beranek & Newman, Inc.	+ 1/4	+ 1.11	+ 31.88
NYSE	13 1/2	20– 16	20 7/8	Bunker-Ramo	+ 4 7/8	+ 30.47	+ 54.63
AMSE	32 1/8	60– 27	50 5/8	• Calcomp	+ 7 5/8	+ 17.73	+ 57.59
OTC	13	17– 10	17 7/8	Computer Equipment	+ 3 1/8	+ 13.49	+ 48.96
OTC	18 1/4	22– 13	31 3/8	• Data Products	+ 1 3/8	+ 4.57	+ 40.16
OTC	18 1/4	27– 15	24 1/2	• Digitronics	+ 3 3/4	+ 13.84	+ 27.27
OTC	39	67– 23	48 1/8	• Electronic Memories	− 2 1/8	− 4.91	+ 24.30
OTC	10	16– 9	18 3/8	• Fabri-Tek	+ 7/8	+ 5.00	+ 83.75
OTC	34	68– 28	68	Gerber Scientific	+ 8	+ 15.25	+100.00
OTC	12 1/2	23– 10	23 1/2	Information Displays	+ 3 3/4	+ 32.35	+ 88.00
AMSE	10 7/8	40– 14	38 1/8	Milgo Electronics	+ 5 3/4	+ 15.38	+250.58
AMSE	110 1/8	218–100	215	• Mohawk Data Sciences	+ 28	+ 14.97	+ 95.75
OTC	74	130– 71	138	• Optical Scanning Corp.	+ 18	+ 15.00	+ 86.48
OTC	72	125– 64	119	Photon	− 5	− 4.00	+ 65.27
AMSE	25 5/8	38– 20	31 1/8	• Potter Instrument	− 7/8	− 3.74	+ 21.46
OTC	40 1/4	93– 38	87	• Recognition Equipment Corp.	− 3	− 3.34	+116.15
AMSE	16	29– 14	23	Rixon Electronics	− 1 3/8	− 5.64	+ 43.75
NYSE	48 1/8	58– 42	53 1/8	Sanders	− 1 1/4	− 2.22	+ 10.51
OTC	38 1/8	51– 38	48	• Tally Corp.	− 2 1/2	− 4.95	+ 10.52
NYSE	242 1/4	321–238	318 5/8	Xerox	+ 16 1/8	+ 5.33	+ 31.53

EXCHANGE	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE	SUPPLIES & ACCESSORIES	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
OTC	48 1/8	64– 41	58	• Acme Visible	—	—	+ 21.88
NYSE	41	32– 18	29 1/4	Adams-Millis	+ 1 1/4	+ 4.68	+ 30.17
OTC	16 5/8	17– 13	16 3/8	• Baltimore Business Forms	+ 1 3/8	+ 9.17	+ 20.19
AMSE	27	44– 21	43 1/4	• Barry Wright	+ 3/4	+ 1.76	+ 60.18
OTC	31 1/4	**	38	Data Documents	+ 1 3/4	+ 5.11	+ 15.20
OTC	27 1/4	36– 28	36 1/4	• Ennis Business Forms	+ 3 1/4	+ 9.84	+ 33.03
NYSE	84 1/8	116– 81	116 3/4	• 3M Company	+ 4 1/8	+ 3.70	+ 37.88
OTC	38	83– 38	83	• Memorex	+12	+16.90	+ 43.10
OTC	27 1/4	32– 28	29 3/4	• Moore Business Forms	− 3/4	− 2.46	+ 9.17
NYSE	57 1/4	71– 47	68 3/4	Nashua Corp.	− 1/4	− 0.36	+ 21.83
OTC	31 1/4	42– 30	42	Reynolds A Reynolds	+ 4 1/8	+13.00	+ 34.40
OTC	34 1/2	35– 29	29	• Standard Register	+ 1	+ 3.57	− 16.04
NYSE	27 3/4	44– 21	21 5/8	• Uarco	− 1 3/8	− 4.17	− 16.23
AMSE	14 1/4	22– 13	18 3/4	Wabash Magnetics	− 1 1/4	− 6.25	+ 21.67
OTC	13 3/4	36– 34	22 3/4	• Wallace Business Forms	+ 5 3/4	+ 9.17	+ 67.15

EXCHANGE	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE	SOFTWARE & EDP SERVICES	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
OTC	7 1/2	22– 7	22 1/2	• Advanced Computer Techniques	—	—	[illegible]
OTC	17	27– 14	30 1/2	• Applied Data Research	+ 2	+ 8.10	+ 55.88
OTC	10 1/2	24– 10	23 1/2	Aries	+ 2	+ 9.88	+ 91.91
AMSE	47	60– 40	38 1/8	Automatic Data Processing	+ 2 1/8	+ 5.95	+ 27.28
OTC	3	29– 6	29 1/2	• Brandon Applied Systems	+ 4 3/8	+19.10	+227.78
AMSE	22 7/8	43– 21	27 1/8	• Computer Applications	— —	—	+ 88.22
OTC	7 3/4	10– 7	13 1/8	Computer Environments	− 1/8	− 4.50	+ 69.48
OTC	30	60– 24	53	Computer Network	− 3	− 5.36	+ 76.67
AMSE	60	64– 30	62	• Computer Sciences	+ 3	+ 3.33	+ 55.00
OTC	38	62– 35	45	• Computer Usage	+ 7 1/4	+19.20	+ 18.88
AMSE	38 1/2	60– 38	38 1/8	• Computing and Software	+ 3 3/8	+ 9.87	+ 60.72
OTC	12 1/2	38– 3	18 1/4	• Digitek	+ 2	+12.31	+ 46.00
AMSE	38 3/8	53– 38	41 3/8	Electronic Computer Prog. Inst.	+ 1 1/4	+ 3.11	+ 7.82
OTC	30	60– 28	38	• Informatics	+ 6	+ 9.60	+ 66.36
OTC	21	39– 17	20	Matrix Corp.	− 2	− 9.09	− 4.76
OTC	11 1/8	28– 3	27	• National Computer Analysts	+ 3	+ 8.00	+134.78
AMSE	31	44– 30	43 1/8	Planning Research	+ 3	+ 7.80	+ 38.11
OTC	**	166– 63	100	Scan-Data	− 25	−20.00	**
OTC	5	18– 10	11 1/8	Software Systems	− 5/8	− 5.32	+ 22.61
OTC	20 1/2	22– 13	13 3/4	TBS Computing Centers, Inc.	+ 1/4	+ 1.85	− 32.93
OTC	83	160– 57	158	• University Computing	+ 38 1/2	+33.33	+190.76

EXCHANGE	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE	LEASING COMPANIES	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
OTC	18	28– 16	**	Boothe Computer	**	**	**
OTC	16 1/4	37– 18	27 3/8	• Chandler Leasing	+ 1 7/8	+ 7.35	[illegible]
OTC	11 1/2	11– 8	3 1/8	• Computer Exchange	− 1/8	− 1.39	[illegible]
AMSE	30 1/8	28– 21	22 3/4	• Computer Leasing	− 3/4	− 3.26	[illegible]
OTC	16 1/4	19– 11	19	Cyber-Tronics	+ 1 1/2	+10.35	[illegible]
AMSE	106 5/8	184– 94	140 7/8	Data Proc. Financial & General	+12 1/2	+ 9.74	+ 32.12
OTC	18 1/8	17– 10	16 3/8	Datronic Rental	− 5/8	− 3.68	− 17.93
OTC	20	47– 16	47	Dearborn Computer	+13	+38.23	+135.00
OTC	13 1/4	17– 12	17 3/8	• DPA, Inc.	+ 1/8	+ 0.71	+ 33.00
AMSE	38 3/4	43– 27	38 3/8	• GC Computer Corp.	+ 2	+ 5.21	[illegible]
AMSE	42 1/4	[illegible]	68 3/4	Granite Equipment Leasing	[illegible]	+33.00	[illegible]
• AMSE	40	[illegible]	[illegible]	• Leasco	+ 5 1/8	[illegible]	[illegible]
OTC	5	18– 5	18 1/8	[illegible] Computer Leasing	+ 1 1/8	[illegible]	[illegible]
AMSE	40 7/8	60– 41	58 5/8	• Levin-Townsend Computer Corp.	+ 1 1/8	+ 1.91	[illegible]
OTC	10 1/2	16– 7	5 3/8	• LMR Data, Inc.	—	—	[illegible]
OTC	10 7/8	16– 10	12	• Management Assistance	− 1 1/4	− 9.43	+ 10.30
AMSE	41 5/8	63– 38	49 3/4	National Equip. Rental	+ 5 5/8	+12.76	+ 19.52
AMSE	30	64– 30	37 7/8	• Randolph Computer Corp.	− 5/8	− 1.67	+ 26.25
OTC	10 1/2	48– 10	38 1/2	System Capital Corp.	− 1 1/2	− 3.75	+266.67
AMSE	10 7/8	18– 10	17 5/8	U.S. Leasing	+ 3/4	+ 4.44	+ 62.07

* Stock split **Not available •Companies included in Computerworld's stock trading index for each sector.

Personnel Consulting And the Manager

"...An alert consultant can head off a time-consuming deadend interview."

"Cooperation is the most important aspect of all."

By R.O. Roy

The major concern of a manager is finding and retaining qualified personnel. In the computer field this concern has reached a critical level and requires the judicious use of all employment methods to find adequata candidates. The personnel consulting field is a major source of talent and, if it measures up to the standards of the industry, could very well serve as an extension of a manager's employment efforta. Therefore you, the manager, should be prepared to judge the worth of such firms as they vie for attention and compete for your business.

Professional Standards

Your first tip-off to a firm's professionalism is the maturity of its reaction to, and its concern for, your needs. You should demand of personnel consultants the same professional standards which you demand of yourself. When you contact a personnel firm, you are establishing a business relationship, and this relationship hopefully will produce mutual benefit and profit. If the firm's representative is poised and dignified in his demeanor, listens responsively to your comments, and shows a proper concern for your needs, then you are well on the way to establishing an effective association. The personnel consultant must have the ability to identify with you and your employment needs. Frequently, employment openings can be the source of embarrassment or distress to the manager. A mature consultant will react to your problems without dismay, if the situation is a poor one, and without exaggerated enthusiasm, if a good one.

Responsive Attitude

The personnel consulting firm's response to your specific needs is the measure of its value. If the firm's representative reacts intelligently and presents clear and informative answers to your questions, your chances of locating a suitable candidate increase proportionately. Such reaction, however, should include a personal visit by the consultant to your office with the intent of gaining first-hand exposure to the job specifications. Such visits should be made as often as necessary to insure thorough understanding. In most cases, one visit is sufficient; occasionally, however, several visits are required.

The consultant should present you with timely interviews. If you rely on him to do your footwork, you can save hours of delay and confusion, and also gain an appreciation for what a personnel firm does to earn its fee. Interview scheduling and pre-screened reference information make it easier for you to judge more prudently and question more effectively the candidate in your office. Interview appointments handled expeditiously will lead to interviews with suitable candidates within the most convenient time schedule.

Competence

As a rule, the better tha consultant knows his field, the more competent his judgment. A major sign of competence in a personnel consultant is his technical knowledge. He must be "tuned into" the employment market in general and should have detailed knowledge in the sphere of specific skill. Beyond the technical know-how, such a consultant must have professional contacts within that sphere. You can readily judge this by the quality of the firm's applicants.

As a result of the phenomenal growth of the computer field, a burgeoning new industry has been created. Specialized personnel consulting in EDP exists because there is a real need. This article is written by R.O. Roy, one of the most successful men in this field. Roy started Ro-Mac & Associates a little over three years ago and now has five operating offices in the Northeast and three more in the planning stages. This kind of success comes from doing the job well. He offers this article as a guide to DP managers and employment managers for their dealings with, and selection of, personnel consulting firms. A second article, to be printed in next week's issue of Computerworld *will deal with the same subject from the standpoint of the individual professional man.*

The associates of a computer personnel consulting firm should know the computer field from first-hand experience. Such knowledge works to mutual advantage – your position is satisfactorily filled, and the firm's reputation is enhanced.

The firm should act as a conductor of energy between your company and the candidate. Is the applicant emotionally, as well as technically, suited for the job? If he is, does he have any personal reservations which would inhibit acceptance of the position? Is salary apt to be a problem, either in the initial salary offer or later for salary increases? If the candidate registers negatively to the above questions, an alert consultant can head off a time consuming dead-end interview. Your time is saved by the proper kind of reliance on the personnel consultant.

How does the consultant handle confidential information? Do you have to emphasize the confidential nature of certain information or is the nature of such information tacitly understood? It is reassuring to give "inside information" and know it will be used solely to fill the position. Careless handling of sensitive information can be a source of major embarrassment and annoyance.

Cooperation is the most important aspect of all. A personnel consultant can cooperate effectively only to the degree that you are willing to share the mutual responsibility of filling the position. A manager should rely on the personnel consultant. Such reliance can lead to better interview techniques as well as a clearer definition of position requirements.

After an interview, it is helpful to review tha candidate with the consultant. Your interest may cease after one interview, but you may have a better idea of what you "really" need. Also, close cooperation with the consultant is apt to yield immediate feedback of the candidate's reaction and interest. This is helpful in determining your next step.

If the salary has to be negotiated, a consultant can negotiate as a disinterested third party, thereby eliminating face-to-face bargaining. A candidate doesn't like to be "bought" and a manager doesn't like to be "had." If the consultant has the confidence of both parties, an agreement can frequently be reached to mutual advantage.

Reliable personnel consultants will maintain a thorough and constant review of your employment needs. The consultant should demonstrate an eagerness to do a good job and a desire to establish a lasting and professional relationship. A manager should demand only what he is willing to give – time, money, and interest. If the venture is cooperative, the position will be properly filled and the fee well-earned. Each plays his part and all must cooperate to achieve success – the manager, the candidate, and the consultant.

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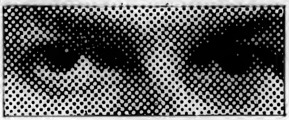

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CRT Photosetter Produces Up to 10 Pages a Minute

CLEVELAND, Ohio – A cathode ray tube phototypesetting system that produces two to 10 pages a minute is being put on the market by Harris-Intertype Corp.

The computer driven system, named the Fototronic-CRT typesetter, composes complete pages of type by photographing characters generated on the face of a high resolution CRT.

The price of the system ranges from $300,000 to $500,000, depending on the configuration needed to meet the requirements of an individual composing room.

The machine was designed primarily to meet printing and publishing requirements, and secondarily as an improved printout device for computers. Harris-Intertype expects principal users of the system to be computer oriented, high volume producers of full-page composition. They include printers or publishers of directories, books, newspapers, magazines, professional abstract, and listings.

The first Fototronic-CRT unit has been composing telephone directory pages for five months at the Baird-Ward Company, Nashville, Tenn. Control is provided by computer processed magnetic tape on which address and telephone number changes are merged with previous listings.

The speed with which individual characters can be generated is determined by the size of type being set. Typical 7-point directory type, of graphic arts quality, can be set at 1100 characters per second. Smaller type can be set considerably faster, larger type proportionately slower.

The machine is designed to be used with computers made by any major manufacturer. It produces type on either film or photo paper, in sizes from 4-point to 24-point, or larger if required. Maximum image width for various models ranges from 8-1/2 inches to 16 inches. A built-in digital memory system provides access to as many as 40 different type faces, or approximately 4000 characters. These faces can be electronically manipulated to produce condensed, expanded, or slanted faces.

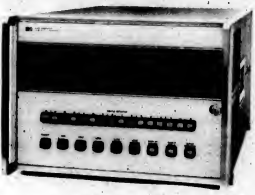
"It is a prime example of the accelerated convergence of graphics and electronics," said Richard B. Tullis, Harris-Intertype president.

Harris-Intertype will display its new system at "Print 68," a major exhibit of printing equipment to be held in Chicago, June 20-26.

Characters generated by the control unit, background, appear on the CRT, right, and are photographed by the camera, left.

Desk-Top Computer Uses 16-Bit Words, Compatible Software

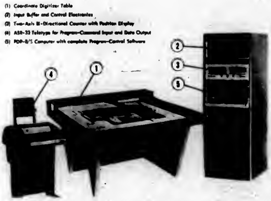
New Products



HP-2114A desk-top computer

A new compact computer, priced at $9950, uses 16-bit words giving it aspects of large computer performance in a desk-top unit. The Hewlett-Packard Model 2144A is upward compatible with other Hewlett-Packard software. This includes ASA Basic Fortran, operable within the standard 4K memory, and Algol and Conversational Basic, operable within the optional 8K memory. Memory is organized into large 1024-word pages, two of which are directly addressable for faster computation. The input/output structure is organized with multi-level priority interrupt. Eight I/O channels are available for interfacing, each with assignable priority interrupt. Standard interface hardware is available for use with the computer. Data acquisition instrumentation such as digital voltmeters and input scanners may be interfaced with available hardware and software. Options include multiplexed I/O, parity check, and power failure protection. Hewlett-Packard, 1501 Page Mill Rd., Palo Alto, Calif. 94304.

Digitizer Programmer


(1) Coordinate Digitizer Table
(2) Input Buffer and Control Electronics
(3) Two-Axis Bi-Directional Counter with Position Display
(4) ASR-33 Teletype for Program-Command Input and Data Output
(5) PDP-8/S Computer with complete Program-Control Software
1
2
3
4
5

UPD-2 Computerized Digitizer Programmer

A new computerized digitizer programmer can code and transfer digital data from drawings, charts, maps, templates, layouts, photographs, or printed circuits to numerical control punched tape for automatic machinery. As an example, punched tape may be prepared from a grid-referenced sketch for circuit artwork generation, and subsequent automated circuit board drilling. The X-Y Coordinate Digitizer provides, by means of the Teletype input/output unit and the computer interface, a punched tape (in 8-level EIA code) with printed prepunch verification. Provision is made to punch machine control commands automatically without coordinates. Data Technology, Inc., 61 Grove St., Watertown, Mass. 02172.

Tape Coupler

ITC-100 Incremental Tape Coupler

A new incremental tape coupler will accept data from various digital devices such as DVMs A to D converters, counters and time code generators, and format it for recording on an incremental magnetic tape transport. The unit accepts data words consisting of four to twelve characters, having four to six bits each, and produces a computer compatible magnetic tape at 200, 556, or 800 bits per inch. Up to 12 characters of fixed identification information may be recorded at the beginning of each record. Modes of operation include advance one character, advance one word, advance one record, and continuous cycle. The ITC-100 interfaces with standard integrated circuit logic levels. Controls may include thumbwheel switches for record length and record identification, a mode select switch and end-of-file switch. Information Control Corp., 1320 E. Franklin Ave., El Segundo, Calif. 90245.

Cartridge Recorder

Designed for performance requirements of bulk storage, memory overflow, program loading, and incremental data recording, a new magnetic tape digital recorder, employing endless loop cartridges (1/4" tape) in 300-ft., 600-ft., or 1200-ft. sizes, will record in phase encoded format at 256 bpi, 4 bits parallel per byte. The unit will handle I/O data up to 8-level code, either serial or parallel and split the data into 4-bit bytes for recording. A reproduce system reconstructs the data into output format to match the original input format. Prices range from $750 to $1500, depending on electronics and package configuration. RWP Corp., 22330 W. Homestead Rd., Cupertino, Calif. 95014.

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